

Patent Application of

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for

Passive Safety Mechanism

Background - Field of Invention

This invention relates to firearms, specifically to the passive safety mechanism of a handgun.

Background - Description of Prior Art

Passive safety mechanisms designed to prevent firing until the trigger is deliberately pulled have long been known in the art. Such safety mechanisms typically incorporate a spring-loaded member which blocks the path of the firing element. Heretofore known passive safety mechanisms suffer from a number of disadvantages:

- (a) Such safety mechanisms are easy to disable because they are incidental to the basic mechanism of the firearm. Such safety mechanisms may be disabled by the simple removal of components without otherwise adversely affecting the normal functioning of the firearm.
- (b) In the event such safety mechanisms are disabled by the absence of components, this condition may not be readily evident from an external examination of the firearm.
- (c) The dedicated springs incorporated in such safety mechanisms are subject to loss during disassembly and failure in service.

(d) Such safety mechanisms increase manufacturing costs due to the requirement of a dedicated surface on the firing element.

Objects and Advantages

Accordingly, among the objects and advantages of the present invention are:

- (a) to provide a passive safety mechanism which precludes normal operation of the firearm when components of the safety mechanism are absent.
- (b) to provide a passive safety mechanism which shows external evidence that safety components are absent.
- (c) to provide a passive safety mechanism which is resistant to improper assembly.
- (d) to provide a passive safety mechanism which consists of a minimum of parts and does not require a dedicated spring.
- (e) to provide a passive safety mechanism which does not require a dedicated surface on the firing element.

Further objects and advantages will become apparent from consideration of the following description and drawings.

Drawing Figures

Fig 1 is a right side view of a single shot pistol incorporating the invention.

Fig 2 is a partial sectional right side view of the frame showing the blocking piece engaged.

Fig 3 is a partial sectional right side view of the frame showing the blocking piece disengaged and the firing element positioned fully rearward.

Fig 4 is a partial sectional right side view of the frame showing the blocking piece disengaged and the firing element positioned fully forward.

Fig 5 is a partial sectional left side view of the frame showing the blocking piece engaged.

Fig 6 is a partial sectional left side view of the frame showing the blocking piece disengaged and the firing element positioned fully rearward.

Fig 7 is an isometric view of the link.

Fig 8 is an isometric view of the blocking piece.

Fig 9 is a left side view of the blocking piece.

Fig 10 is an isometric view of the trigger.

Fig 11 is an isometric view of the triggerbar.

Fig 12 is an left side view of the triggerbar and trigger return spring.

Fig 13 is an exploded view of the trigger, triggerbar, link, and blocking piece.

Fig 14 is a top view of the trigger, triggerbar, link, blocking piece, and trigger return spring.

Fig 15 is a top view of the trigger, triggerbar, link, blocking piece, and trigger return spring with the trigger pulled fully rearward.

Fig 16 is a left side view of the frame.

Fig 17 is a left side view of the frame and blocking piece.

Fig 18 is a rear view of the frame and blocking piece.

Reference Numerals in the Drawings

| | |
|----|---------------------------------------|
| 10 | Single shot pistol |
| 12 | Right grip plate |
| 14 | Barrel |
| 16 | Hinge pin |
| 18 | Frame |
| 20 | Trigger |
| 22 | Triggerbar |
| 24 | Trigger return spring |
| 26 | Sear |
| 28 | Firing element |
| 30 | Sear catch |
| 32 | Driving Spring |
| 33 | Guide |
| 34 | Blocking piece |
| 35 | Vertical projection of blocking piece |
| 36 | Recess |
| 38 | Surface |
| 40 | Backstrap |
| 42 | Upper cross pin |

- 43 Lower cross pin
- 44 Transverse projection of blocking piece
- 46 Mandrel
- 48 Stop pin
- 50 Link
- 52 Cam Track
- 54 Horizontal segment of cam track
- 56 Inclined segment of cam track
- 58 Camming stud of link
- 60 Connecting arm of link
- 62 Trigger hole
- 64 Triggerbar hole
- 66 Spring seat of trigger
- 68 Bearing surface of triggerbar
- 70 Assembly of 20, 22, 24, 34, and 50
- 72 Slot
- 74 Window
- 76 Opening

Description - Figs. 1 to 18

Fig 1 shows a single shot pistol 10 which incorporates the invention. Pistol 10 has a barrel 14, a frame 18, and a trigger 20. Fig 1 also shows a right grip plate 12. Barrel 14 is pivotally mounted to frame 18 via a hinge pin 16.

Fig 2 shows a triggerbar 22 which is pivotably connected to trigger 20. Trigger 20 is longitudinally slidable and is maintained in battery position by a trigger return spring 24. Trigger return spring 24 is a left hand wound 90 degree torsion spring and is located within a recess 36 in frame 18. Trigger return spring 24 is mounted on a cross pin mandrel 46 and is constrained from rotation by a stop pin 48. Trigger return spring 24 bears upon triggerbar 22 and serves to place a forward bias on both trigger 20 and triggerbar 22. Trigger return spring 24 also has a vertical component of force which urges the free end of triggerbar 22 upward into the battery position. Triggerbar 22 has an integral sear 26 which engages a firing element 28 via a sear catch 30. A similar firing element is disclosed in U.S. Patent application ^{Serial Number 081,962,026} filed 1997 October 31 which is hereby incorporated by reference in its entirety herein. Firing element 28 has a driving spring 32 mounted on a guide 33. Inadvertant forward motion of firing element 28 is prevented by a blocking piece 34 having a vertical projection 35 which impedes the forward path of sear catch 30. Blocking piece 34 is vertically slidable within recess 36. Blocking piece 34 is substantially the same longitudinal length as the available space in recess 36. Longitudinal translation of blocking piece 34 is constrained by a surface 38 and a removable backstrap 40. Backstrap 40 aligns and guides blocking piece 34 and is retained by an upper cross pin 42 and a lower cross pin 43. Removal of backstrap 40 allows for rearward access to recess 36 for installation of components. Transverse translation of blocking piece 34 is constrained by a transverse projection 44,

made integral with blocking piece 34, which substantially spans the transverse width of recess 36. Figure 18 further shows the positioning of blocking piece 34 within recess 36.

In Fig 3 trigger 20 has been translated rearward into the firing position. Trigger bar 22 and firing element 28 have translated with trigger 20. Triggerbar 22 has also been cammed downward through known means to disengage sear 26 from sear catch 30. Firing element 28 is about to be propelled fully forward. Blocking piece 34 has moved downward to provide a clear forward travel path for firing element 28. Vertical projection 35 no longer impedes the path of sear catch 30. In Fig 4 firing element 28 is shown after having moved fully forward. Releasing trigger 20 at this point will allow trigger 20 and triggerbar 22 to automatically reset to the battery position.

Figs 5 and 6 show a link 50 which translates with trigger 20. Link 50 engages a cam track 52 integral with blocking piece 34 and thereby controls the vertical motion of blocking piece 34.

Fig 8 gives an overall view of blocking piece 34 while Fig 9 shows cam track 52 more clearly. Cam track 52 has a horizontal segment 54 and an inclined segment 56. The shape of cam track 52 is such that blocking piece 34 does not begin downward movement until horizontal segment 54 has been cleared.

Fig 7 shows link 50 more clearly. Link 50 has a camming stud 58 which rides in cam track 52 of blocking piece 34. A connecting arm 60 is designed to connect trigger 20 with triggerbar 22 and provide a pivot for triggerbar 22. Connecting arm 60 passes through a trigger hole 62 shown in Fig 10 and on into a triggerbar hole 64 shown in Fig 11. These relationships are shown more ^{concisely} in Fig 13.

Returning to Fig 11, triggerbar 22 has a bearing surface 68 and a spring seat 66 to accomodate trigger return spring 24. Fig 12 shows how trigger return spring 24 engages spring seat 66.

Figure 14 shows an assembly 70 of trigger 20, triggerbar 22, trigger return spring 24, blocking piece 34, and link 50 in the battery position. Connecting arm 60 serves to join trigger 20 to triggerbar 22. Because of this feature, normal operation of the firearm will be precluded if link 50 is removed from assembly 70 since trigger 20 will thereby be disconnected from triggerbar 22. Bearing surface 68 bears against blocking piece 34 in order to maintain proper alignment of triggerbar 22. A left hand wind tends to force trigger return spring 24 out of spring seat 66. Blocking piece 34 counters this tendency and serves to keep trigger return spring 24 properly positioned in spring seat 66. Thus, if blocking piece 34 is removed from assembly 70, triggerbar 22 will suffer misalignment and become disconnected from trigger return spring 24, thereby precluding normal operation of the firearm. Figure 15 shows assembly 70 with trigger 20 in the rearwardmost position. Bearing surface 68 rides along blocking piece 34 while trigger return spring 24 is maintained within spring seat 66.

Fig 16 shows a slot 72 which accepts link 50. Near the forward portion of slot 72 is an opening 76 of small width. Connecting arm 60 accesses trigger hole 62 and triggerbar hole 64 through opening 76. The rearward portion of slot 72 is cut through as a full width window 74 into recess 36. Camming stud 58 accesses cam track 52 through window 74. The location of window 74 is positioned such that link 50 cannot be fully installed unless camming stud 58 properly engages cam track 52, assuming that blocking piece 34 is present. This feature is shown in Fig 17. Mandrel 46 limits the downward position of blocking piece 34 such that window 74 is sufficiently obstructed by blocking piece 34 to prevent the inadvertent installation of link 50 with camming stud 58 located above blocking piece 34. Provided blocking piece 34 is present, link 50 can only be fully installed when camming stud 58 properly engages cam track 52.

Conclusion, Ramifications, and Scope

Thus, the reader will see that the passive safety mechanism of this invention precludes normal operation of the firearm when safety components are absent, shows ~~external evidence that safety components are absent~~ ^{external} is resistant to improper assembly, consists of a minimum of parts, does not require a dedicated spring, and does not require a dedicated surface on the firing element.

Although the description above contains many specificities, these should not be construed as limiting the scope of the invention, but rather as an exemplification of one preferred embodiment thereof. Many other variations are possible. For example, the connecting arm could be replaced by a separate pin; trigger, triggerbar, and link could be connected through alternate means; camming means other than a track and stud could be used; the spring seat can be changed in shape and location so as not to be dependent on the locking block, a trigger return spring other than the torsion type could be used, etc.

Accordingly, the scope of the invention should be determined not by the embodiment(s) illustrated, but, by the appended claims and their legal equivalents.